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WATER RESOURCES OF THE STATE OF NEW JERSEY[1]

The present report is of special interest to our readers, not only because of its engineering implications, which one might naturally anticipate in a report of this character, but because of a number of interesting viewpoints regarding water supply development and control which Mr. Hazen tentatively suggests. Whether one agrees or not with some of his recommendations, yet the interest and novelty of the suggestions remain sufficiently strong to warrant directing attention to them here.

It is not often that attention is called to the desirability of conserving the water resources of a single community and still rarer is it to find an injunction which seriously considers the development and conservation of the water suppplies of an entire state. The author points out an interesting justification for this latter principle, by noting that water supplies, unlike other natural resources, are not decreased in capacity by use; and that the development of a water supply assures its present and future availability, while a failure to undertake conservation frequently results in the diversion of water rights and sites to other uses. The mere existence of natural resources does not insure a permanent supply of water. Conscious preparation for the future is a necessary adjunct for permanency.

The report outlines in some detail, the present water supply conditions in the so-called "Metropolitan District" (with which the investigation is mainly concerned), comprising the counties of Bergen, Essex, Hudson, Middlesex, Passaic and Union, in which there are thirty-three water supply systems, serving 2,070,000 people. Quantitative information relative to these supplies is set forth in tabular form in the discussion. Important facts appear in this survey of existing supplies, of which the following are of special interest. In 1920, surface waters were called upon to supply 204,000,000 gallons per day, while underground sources furnished 40,000,000 gallons per day. The population supplied by publicly owned plants was 983,335, that by private companies, 1,087,147. The effect upon per capita consumption in these two classes appears in the figures of 139 and 99 gallons per capita per day, respectively, for the above populations. Likewise, in 12 systems with 90 per cent or more of the services metered, the per capita consumption was only 89, while it averaged 154 gallons in 21 systems having less than 90 per cent metered services.

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[1] Review by the Editor of a report by Allen Hazen, Consulting Engineer, of Hazen, Whipple and Fuller, to the Board of Conservation and Development of New Jersey.

The author estimates the capacities in a dry year of the present sources as 268,000,000 gallons per day. With a daily consumption in 1920 of 244,000,000 gallons, it is clear that action looking toward the extension of existing and the incorporation of new water sources is important. Considering the future requirements of both public and private industrial water users, Mr. Hazen concludes that the total water requirements will be 575,000,000 and 880,000,000 gallons daily in the years 1950 and 1970, respectively.

Fortunately abundant sources of water supply are available in the State. In addition, the population needing water is concentrated within short distances of favorable sources. Within 50 miles of urban centers are found catchment areas of 1718 square miles, that might be made tributary to future water works. Of this, 1577 square miles are in New Jersey and amount to 21 per cent of the area of the State. The streams in the southern part of the State are not included in the above figures. The complete development of the above catchment areas would yield 1,550,000,000 gallons per day, only a little less than twice the amount estimated as required in 1970.

In this connection, also, Mr. Hazen advises much more comprehensive and deliberate action than is usual in such matters, by suggesting the possible purchase of certain areas of watersheds for the purpose of removing from the market as much as possible of the land and to make long term leases to present owners. It would be fruitful to gain some discussion on the wisdom or possibility of such a policy of permanent artificial control of the parts or whole of watersheds.

The four principal developments considered for the Metropolitan District are:

1. Complete or partial development of the Passaic River.
2. Long Hill Reservoir fed by northern streams.
3. Raritan development, supplemented ultimately if needed, by water from the Delaware River.
4. Mullica and Wading Rivers, and other southern streams.

It is estimated that the probable capacities and costs of these four projects are as follows:

	PASSAIC GREAT RESERVOIR	LONG HILL SYSTEM	RARITAN	MULLICA AND WADING RIVERS
Total cost, millions of dollars	101	130	110	125
Capacity, million gallons per day	450*	750	400	300
Cost per million gallons daily capacity, dollars	225,000	173,000	275,000	417,000

* In addition to 200,000,000 gallons now obtained and allowing for a flow of 80 million gallons daily for lower river water rights.

The author points out that the Long Hill system is in general more advantageous than the Passaic Great Reservoir, on account of greater elevation of water in the former, absence of pumping, smaller population on catchment area, and the possibility of progressive development, whereas the Passaic scheme would require immediate and almost complete initial construction. This latter scheme, however, offers advantages in flood protection of the lower Passaic valley which do not appear in the Long Hill system. The Mullica and Wading Rivers are considered to be too far distant for economical development, while the Raritan, although furnishing an excellent supply at a reasonable cost, is more expensive than the other available resources.

It is definitely recognized in the present report that a comprehensive solution of a problem which involves such a diversity of ownership as is represented by thirty-three separate systems is not to be expected through voluntary cooperation. For this reason, the creation of a state water board is recommended. This board is to be given the power to acquire existing sources of supply, lands and rights for additional sources, to build water supply works, to sell water at wholesale and to issue bonds to pay for its undertakings. The board is to be composed of three members. The manner of selecting these is, however, not suggested, although it would have been helpful if the author had established a definite procedure, such as appointment by the governor or joint selection by governor, state board of health and public service commission (or its equivalent). Sometimes such specific recommendations do much to eliminate subsequent political controversies.

The board as here constituted is to furnish water at wholesale to any municipality or water company in the six counties. With such an arrangement, the board will control only the main distributors and but little of the local distribution systems. In the same manner, it may exert no authoritative supervision over the consumption of water. Although this plan provides for a maximum degree of local autonomy, it might be questioned whether greater economy in engineering and financing might not result by complete control of the enterprise, in all of its ramifications, by the governing board. The subsidiary portions of a water system are so closely linked, in plan and in control, with the main supply that it is difficult to see why their management should be separated.

Another interesting suggestion upon which some might take issue with Mr. Hazen is the reference to the possibility of a dual system of water supply for the territory here discussed. After showing that industrial uses are quite as great as domestic uses, the author pertinently inquires "why not have two grades of water like two grades of milk? Grade A water to be used for the primary system and for all domestic purposes, and Grade B water to be used for industrial purposes?" As Mr. Hazen recognizes in his further discussion of this problem, the final answer rests, on the one hand, upon a comparison of charges for auxiliary distributors for industrial use as against additional pure water supply and, on the other, upon the public health danger of even a heavily chlorinated industrial water supply (as the report suggests). Where additional pure water, because of industrial demand, is even slightly more costly than an auxiliary impure supply and its necessary appurtenances, prudence might warrant the greater expenditures.